A new histiostomid mite (Acari: Astigmatina: Histiostomatidae) from blue penguin burrows.

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Abstract

Histiostoma mantelli new species is described and illustrated from females and males collected from moulting burrows of blue penguin *Eudyptula minor* at Tongaporutu, North Taranaki, New Zealand.

Keywords: Histiostomatidae - *Histiostoma* - new species - guano mite - blue penguin – *Eudyptula minor* – New Zealand

Introduction

Mites of the family Histiostomatidae are often collected as phoretic deutonymphs on insects but the feeding life-history stages use damp temporary habitats. Histiostomatidae is one of the largest families of the Astigmatina with about 500 species in 58 genera (Kurosa & Tagami 2006; OConnor 2009). They frequently feed on bacteria, fungi or nematodes in habitats such as guano or dung. The family is regarded as a basal group to the astigmatine mites (OConnor 2009). Some are aquatic (Fashing 2002). However few genera are described from both the deutonymphs and trophic forms (larva, nymphs and adults) and about 85% of named species are described only from the deutonymph. Thus two taxonomies of the family exist. The native New Zealand histiostomids are poorly known, athough a member of the *Histiostoma feroniarum* group, a cosmopolitan synanthrope, was reported by Womersley (1941) and Ramsay (1966). Fain & Galloway (1993) described the trophic forms of the guano mite, *Myianoetus antipodus* from white-flippered penguin *Eudyptula minor albosignata* burrows or moulting sites on Motunau Island and Banks Peninsula. Clark (2009) described the deutonymph of that species. This paper describes a second histiostomid species from blue penguin *E. minor* burrows.

Methods and Conventions

Penguin burrow floor material consisting of compacted guano and feathers from two vacant blue penguin *E. minor* moulting chambers was removed and examined under a dissecting microscope. Mites were collected, cleared in Nesbitt's fluid; slide mounted in Hoyer's gum chloral; viewed under phase contrast optics and illustrated with the aid of a camera lucida. *Myianoetus antipodus* was present, in addition to a second histiostomid species that is described

here. All measurements given are in micrometres. Adult leg nomenclature, including coxal setae, follows Bongers *et al.* (1985); adult body setae use Grandjean's system (Griffiths 1990); propodosomal setae nomenclature follows OConnor (2009) i.e. rostral (ro), lamellar (le), for the setae formerly *ve* and *vi* and the two posterior pairs are the interlamellar (*in*) and the exbothridial (*ex*) formerly called *si* and *se*.

Systematics

Family diagnoses of Histiostomatidae Berlese, 1897 (= Anoetidae, Oudemans, 1904) are given in OConnor (2009) and Schuecher (1957). Generic diagnoses are given in Scheucher (1957) and Hughes & Jackson (1958). While Scheucher (1957) provided keys to genera and species based on male, female and deutonymph characters, Hughes & Jackson (1958) and other workers, notably Mahunka (1972), based their keys solely on the deutonymph. The deutonymph was not available for description in this new species.

The generic diagnosis for females of *Histiostoma* Kramer, 1876 in Scheucher (1958) is translated from German as: ovipore (vulva) transverse between coxa II & III; anterior genital papillae on same level; posterior genital papillae high in coxal field IV or medial between III & IV: and for males as; genital apparatus hardly protrusible; tarsus I with one dorsal terminal setiform setae; tibia I & II with solenidion ϕ short. Hughes (1976) provided a similar generic diagnosis in English. The species described below bears these characters. A list of 300 species of the Histiostomatidae is available online (Hallan 2008). *Histiostoma* contains 95 species on that list.

Histiostoma mantelli **new species**

FEMALE: Figures 1 & 2. Length x width means 275 x 150; range 250-310 x 130-200 (6 paratypes). Box to egg shaped; guanine white, with thin shiny cuticle and pale legs. Gnathosoma: Figure 2. Chelicerae much flattened to a blade 6 deep, fixed digit with a hoe-like apical tooth 5 long and two equal sub-apical teeth 1 long; movable digit with at least one strong apical tooth. Solenidion ω 35 with eupathidia *ul'* 8; sub-capitular *m* 8.

Dorsum: Figure 1. Prodorsal shield 60 x 60 punctate, domed. Rostral setae *ro* filiform spiralled c.30 long; lamellar *le* flagelliform 14 long pressed to shield. Propodosomal shield interlamellar setae *in* 15, exbothridial *ex* 25 long both pectinate arising on the shield margin; shield 55 wide. Sejugal furrow entire, deep. Hysterosomal cuticle thick, warty or striated bearing 4 pair of dorsal shields as illustrated; Setae *d1, c2* and *c3* not inserted to shields; all dorsal setae curved, pectinate 15 – 25 long on shield lateral or posterior edges. Vestigial alveoli present on shields of segment E. Setae *h1* and *h2* (obscured on caudal bulge) appear to be on pedestals, not shields. Bursa copulatrix is on a level with seta *e1* inserted on a raised cone and connected to a long ductus. Internal spermathecal sclerites not seen. Cupules *ia* and *im* as illustrated; *ip* not seen.

Venter: Figure 2. Ovipore transverse, flanked by sejugal apodemes slightly in front of the anterior genital papillae (*agp*): posterior genital papillae (*pgp*) mid-way between ovipore and anus anterior. All papillae circular, 3 in diameter. Coxal, genital and pseudanal setae all 12 long. All coxae with a punctate triangular pattern. Epimeres I meet to be weakly fused: Epimeres II, III and IV short and free. Never more than one egg /female.

Legs: Figure 2. All pretarsi have pulvilli. On legs III and IV there is a ventral pullvilus lobe which is pointed in a lateral view (Figure 2C). The average length of leg segments; tarsus (incl. pretarsus), tibia, genua, femur for legs I – IV; I, 65 25 20 35; II, 60 20 20 35; III, 55 20 20 20; IV, 70 20 20 30; (**Σ**, 145 135 115 140) n = 3 paratypes. Leg chaetotaxy , I – IV: Tarsus, 13 12 10 10; Tibia, 2 2 1 1; Genua, 2 2 0 0; Femora, 1 1 0 1; Trochanters, 1 1 1 0. Setae *aa* and *ba* fan like, fluted and flattened. On legs I and II setae *gT, hT, cG, mG* and on legs III and IV, *kT, d* and *w* are all flattened, curved, asymmetrical and hyaline as illustrated. Other leg setae are conical spines except *d* and *pR* that are setiform, on legs I and II; Solenidiotaxy (genua-tibia-tarsi): Leg I, 2 3 1; II, 1 1 1; III, 0 1 0; IV, 0 1 0. On leg I, σ_1, σ_2 both 15, ϕ 22, ω_1 22, ω_2 12, ω_3 10. On leg II, σ_1 10, ϕ 20, ω_1 27. On leg III, ϕ 20. On leg IV, ϕ 20.

MALE: Figures 3 & 4. Sexual dimorphism marked. Length (incl. gnathosoma) x width 240 x 130, n=4 paratypes. Box like body shape; male is smaller and more sclerotised than female. Cerotegument with detritus attached. Legs of female form - unmodified.

Dorsum: Figure 3. Rugose, pigmented with rostral setae (*ro*) and lamellar

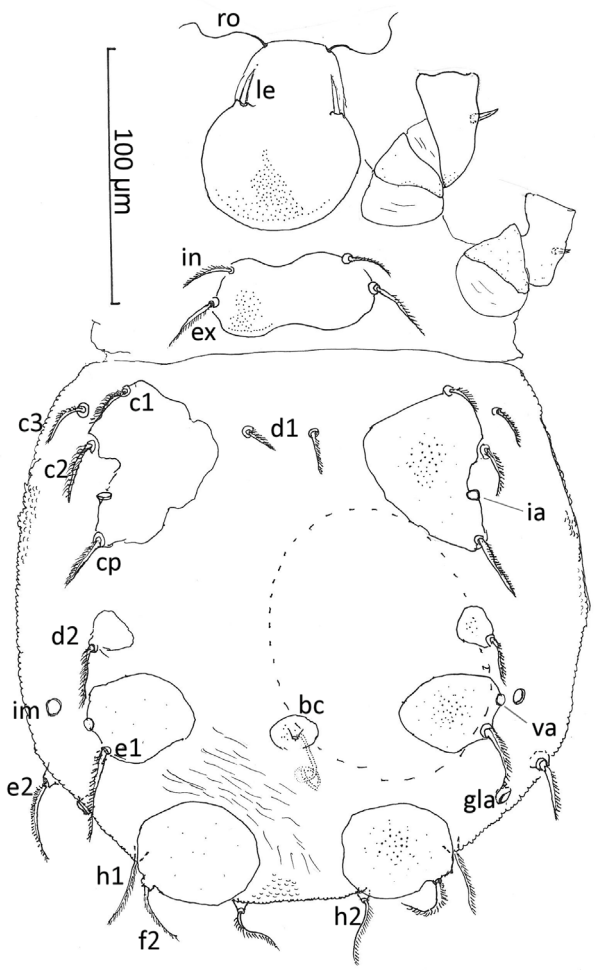

Figure 1: Female dorsum

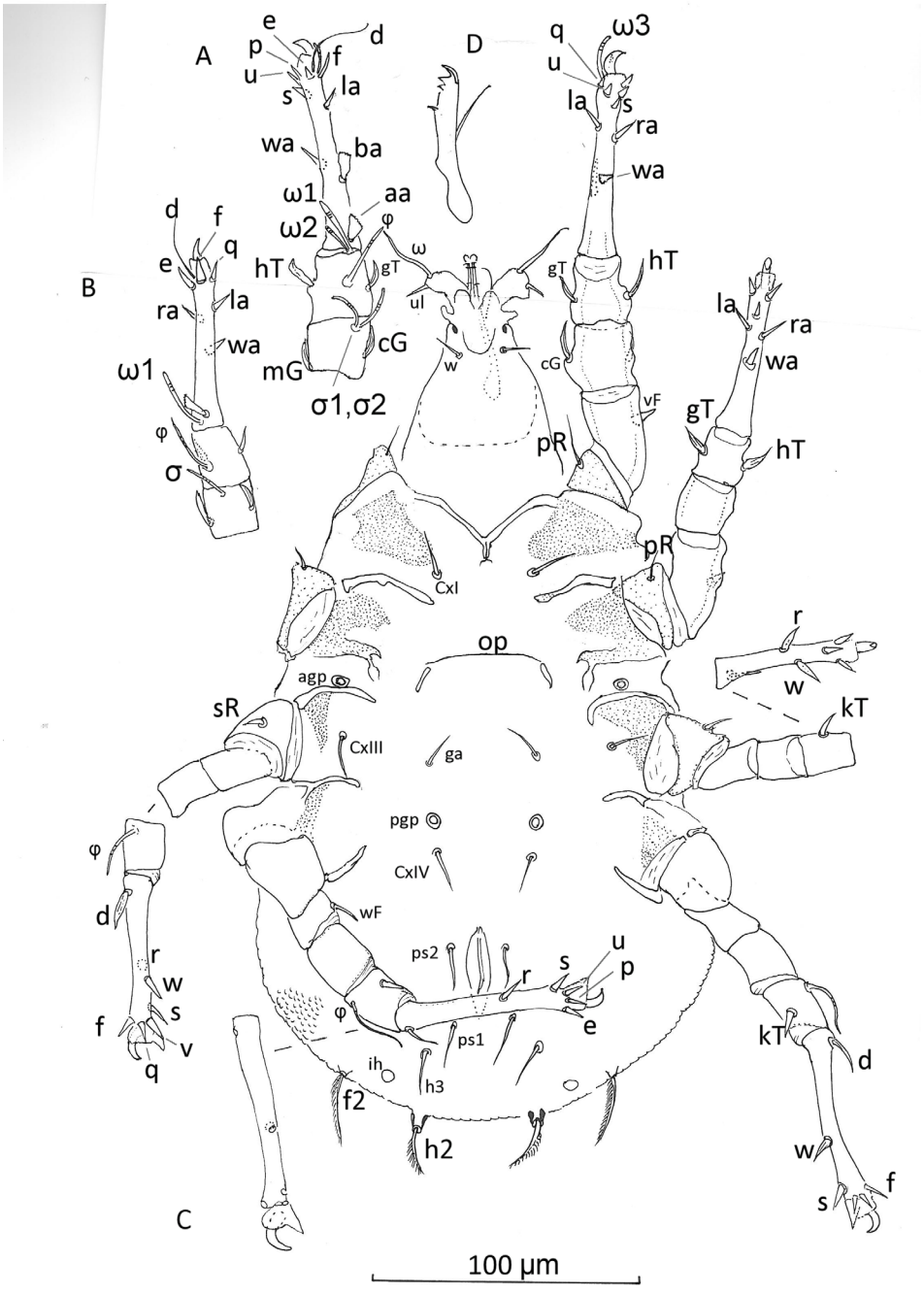

Figure 2: Female venter.

(*le*) as for female. Setae *in* and *ex* equal 12 long but flagelliform, not pectinate as in female. Raised thicker cuticle holding setae *in* and *ex* forming indistinct shield margins – not illustrated. Sejugal furrow distinct. Hysterosomal setae are all curved flagelliform, equal, 12 long, set in thickened cuticle; not on shields as in female. No vestigial alveoli *f1* seen. Cupules as illustrated; cupule *ip* not seen.

Venter: Figure 4. Thickened pigmented cuticle stronger anteriorly with

punctation. Epimeres I fused to short sternum c. 20 long; epimeres II faintly enclosing entire coxal field , almost fused to epimeres III. Epimeres III weak but enclosing almost entire coxal field and having stronger epimerite. Copulatory organ level with posterior genital papilla, CxIV seta and posterior of coxa IV field. Both *pgp* and *agp* set as to form a trapezium in a trench with superficial rings *agp* and *pgp* 3 in diameter but opening into larger chitinous cones, not illustrated, inside the mite. Setae Cx I, CxIII, CxIV, *ga*, *ps2* and *h3* all equal about 12 long; *ps2*, 20 long.

Legs: Figure 3 & 4. Segment lengths of tarsus (incl. pretarsus), tibia, genua, femur for legs I – IV; I 50 20 20 25; II, 45 15 15 30; III, 45 15 15 25; IV, 50 20 20 25; (Σ 115 105 100 115). Chaetotaxy as for female. Setae form as for female but shorter; tibial and genual spines on I and II not conical, but flattened, often lying near the cuticle of leg segment. Solenidi-

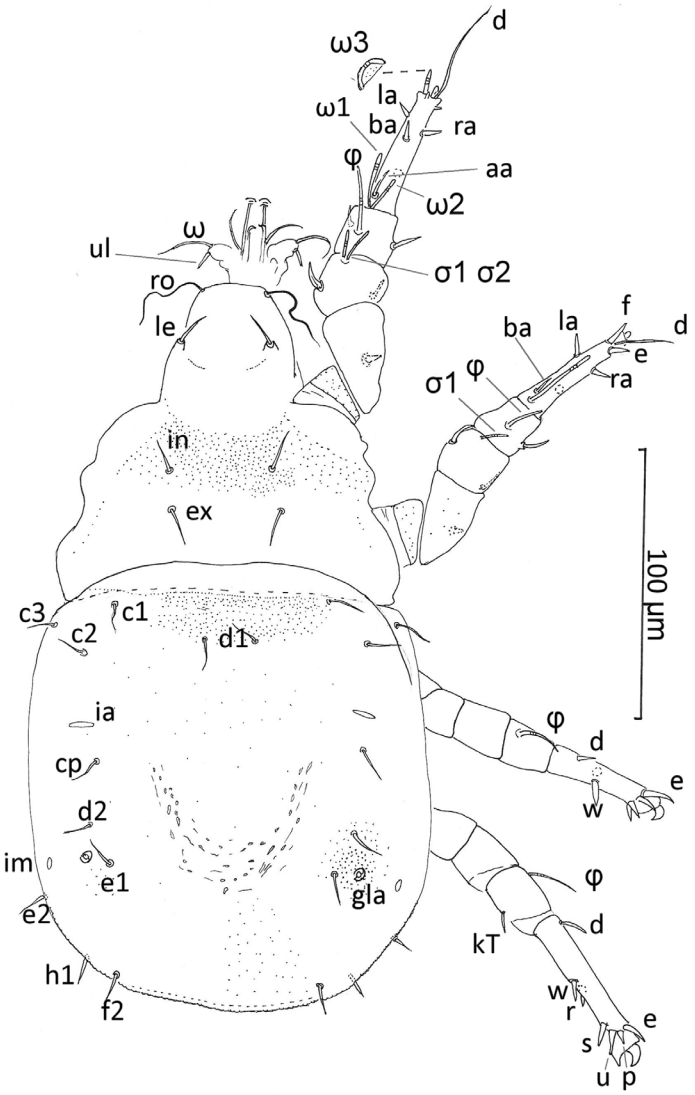

Figure 3: Male dorsum

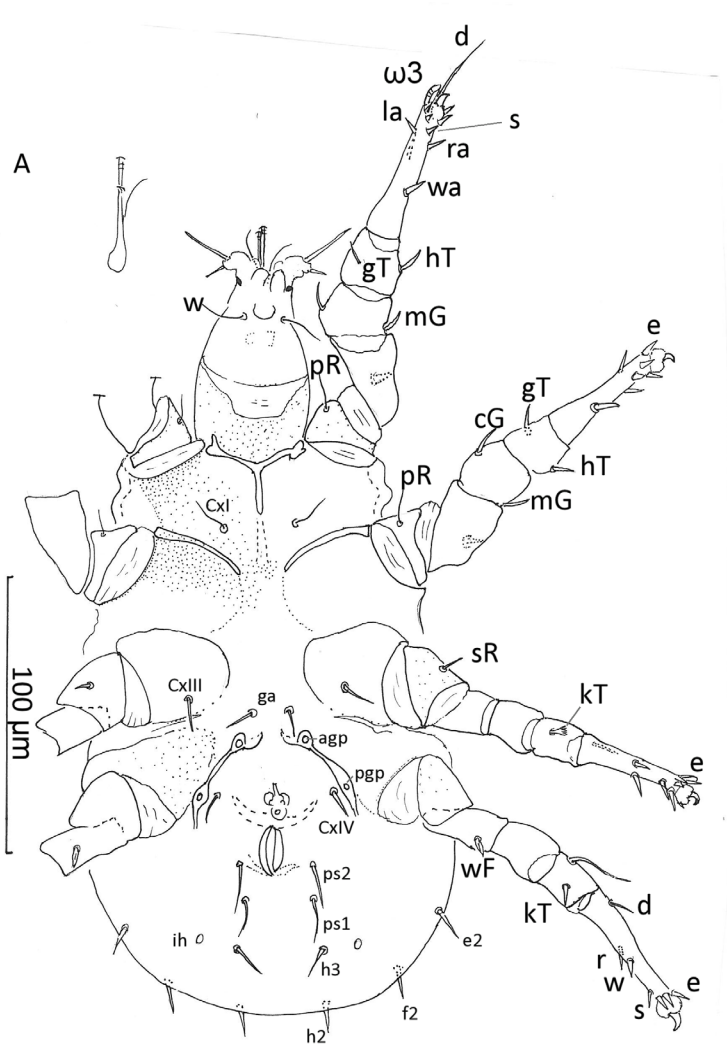

Figure 4: Male venter

otaxy as for female. On leg I, σ_1 10, σ_2 7, ϕ 25, ω_1 20, ω_2 15, ω_3 (curved rod with membrane) 10. On leg II, σ_1 10, ϕ 15, ω_1 27. On leg III, ϕ 15. On leg IV, ϕ 15.

DEUTONYMPH: Unknown

Etymology

The mite is named for the late Mr. Lynley Mantell; farmer and conservationist of Tahora and Tongaporutu.

Notes

The new species occurred at Tongaporutu with another guano mite, *Myianoetus antipodus* Fain & Galloway (1993). On Nov 14 2009 *Myianoetus antipodus* was collected from an *E. minor* burrow entrance under the Matiatia wharf, Waiheke Island, Auckland. Thus *M. antipodus* is now recorded from Hauraki Gulf, North Taranaki Bight and Pegasus Bay/Banks Peninsula.

Histiostoma mantelli differs from the

cosmopolitan *H. feroniarum* reported from New Zealand (Womersley 1941) as follows: *H. mantelli* adult females bear pectinate hysterosomal setae whereas *H. feroniarum* has simple setae; the four genital papillae of *H. mantelli* males form a trapezium; *H. feroniarum* are arranged in a rectangle. *Histiostoma piloseta* Hughes & Jackson (1958) which was collected from compost at Ellerson, Virginia, USA, is similar to *H. mantelli*; both are sexually dimorphic; males are smaller, and they both lack the shield mounted pectinate hysterosomal setae. However, *H. mantelli* has one prodorsal shield while *M. piloseta* has two and *H. piloseta* lacks the shield of C segment. The new species is not similar to any histiostomids described from Australia (Australian Faunal Directory 2009).

Type material

Holotype female and a male paratype on the same slide; paratype females and a tritonymph exuviae holding a pharate female are deposited in the Canterbury Museum, Christchurch, New Zealand. Male and female paratypes are deposited at NZ Arthropod Collection, Landcare Research, Tamaki Campus, Auckland, New Zealand. All material collected 38° 50'S, 174° 36'E, Tongaporutu, North Taranaki from moulting burrows of blue penguin *Eudyptula minor* 4 March, 1994 by J.M.Clark.

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